

SECTION 2

Old Growth Inventory

Updated December 2005



Section 2

Introduction

The Old Growth Definition Committee was convened by the Washington State Department of Natural Resources in response to 2004 legislative direction ESHB 2573, section 905¹. Section 905 directed DNR to conduct an inventory of old growth on state lands as defined by a panel of scientists. As discussed in Section 1 of this document, the Old Growth Definition Committee established an old growth indexing method to use with data from DNR's Forest Resource Inventory System (FRIS). The Committee field-tested the Index by assessing a sample of stands in the Olympic Peninsula, Southwest Washington, and Klickitat County. A Weighted Old Growth Habitat Index of greater than 60 was found to be reliable for identifying potential old growth on the west side. The Committee also established a secondary screening process for stands with somewhat lower Index values that might contain old growth after a secondary screening is conducted.

Old growth stands identified using the Weighted Old Growth Habitat Index

In Western Washington, the FRIS-based Weighted Old Growth Habitat Index identified 52,666 acres that are likely to be old growth. This acreage includes areas where FRIS inventory is not complete, and where old-growth acres have been identified through other processes (such as habitat screening and origin year assessment) as old growth. The 52,666 acres represents approximately 4 percent of the forestland covered by the Habitat Conservation Plan (HCP) for state trust lands in Western Washington. A large majority of this acreage is located on the Olympic Peninsula, located within the Olympic Experimental State Forest (OESF).

1. ¹ ESHB 2573, section 905: "The Department of Natural Resources shall conduct an inventory on state lands of old growth forest stands as defined by a panel of scientists. The panel of scientists shall include three scientific scholars with well documented expertise in Pacific Northwest forest ecology, one of whom will serve as the chair by consensus of the panel, one representative from the department of natural resources, and one representative from the Washington department of fish and wildlife. The panel shall review the best available scientific information and develop a definition for old growth stands in Washington state. The inventory shall include maps illustrating the distribution of old growth forest stands on state lands, and tables describing the number of acres of stands in each county, the department's administrative unit, and forest type. The maps and tables shall identify both structurally uniform and structurally complex stands. The department of natural resources shall make a report of the inventory to the appropriate committees of the legislature.

2. For the duration of the study, cutting or removing trees and stands 160 years or older is subject to the department publishing notification of proposed cutting or removal of old growth timber.

3. This section expires Jun 30, 2005."

Stands needing a secondary screening for potential old growth

On the west side of the Olympic Peninsula, field-testing of the Weighted Old Growth Habitat Index (Index) revealed that it was scoring some known old growth stands below the threshold of 60. This was due to issues in spatial interpretation of FRIS data, and also due to stand characteristics unique to that physiographic region. Consequently, on the Olympic Peninsula, a secondary screening process was recommended for stands that score between 38 and 59 on the Index, to assess whether they include an old growth component. Elsewhere in Western Washington, different climactic and site conditions resulted in a recommendation that a secondary screening be conducted on stands that score between 50 and 59 on the Index. In total, the FRIS-based index has identified approximately 35,769 acres where a secondary screening process is necessary to determine if these stands contain old growth. This acreage also includes areas where FRIS inventory is not complete, and has been identified as potential old growth through habitat screening and stand age assessment.

The first step for this secondary screening process is to visually screen these FRIS mapping units using aerial photography to assess if they contain old growth. The second step is to verify the plant association group (or PAG) to determine if there is a low site potential (slow growth conditions) on the site that would result in old trees with small diameters. The third step, where needed, is to calculate the Weighted Old Growth Habitat Index value for each individual sample plot within the FRIS mapping unit, and perform adjacency analysis on plots in bordering FRIS mapping units to determine the areas meeting the Weighted Old Growth Habitat Index threshold. This process will identify areas of potential old growth within and between the FRIS mapping units. Most of this secondary screening for the western Olympics has been completed. Based on this secondary screening process, there likely will be some adjustments to the acreage identified as old growth.

Old growth on DNR-managed lands in Eastern Washington

The Old Growth Definition Committee researched and field-tested the U.S. Forest Service Region 6 Interim Old Growth Definitions, and determined that they were inadequate for use on DNR-managed forests in Eastern Washington. DNR currently does not have sufficient data to develop a reference condition for old growth forests on the Eastside, nor does the agency currently have a methodology for defining or mapping these stands.

The issues surrounding old growth in Eastern Washington differ from those of Western Washington in many ways:

- Harvest and fire history on the east side of the Cascades has left a very different legacy than on the west side of the Cascades. Where Westside forest development historically proceeded as a result of natural disturbance (such as fire and wind events) that replaced entire

stands, Eastside forest development was historically “gap-based”—that is, patches of trees die off as a result of root rot disease, insect infestation, and/or small scale low intensity fires, and are replaced, patch by patch, with younger cohorts of trees.

- Forest structure on the Eastside is affected by a more continental climate than the Westside. On the Eastside, dead, down woody debris does not persist for long periods of time on the forest floor; the trees are widely spaced, giving the stands a more open appearance; and large, legacy trees are scattered throughout stands of younger trees.
- Extensive field assessments will be required to establish an old growth reference condition to enable the development and application of a structural index such as the Weighted Old Growth Habitat Index for the Eastside. DNR plans to conduct the needed research and develop an old growth definition for Eastern Washington as a part of the sustainable harvest calculation for the Eastside.
- Eastside forests evolved with fire, and in the absence of fire, active management will be required to mimic fire-associated processes in order to develop and sustain old growth characteristics over time. In their current fire-suppressed state the stands are vulnerable to stand replacement fires—high intensity fires that kill nearly all the trees in the stand.

Interpretation of the Forest Resource Inventory System data

The sampling methodology used in the DNR Forest Resource Inventory System (FRIS) was not designed to locate stands of old growth on DNR-managed lands. It is important to recognize that errors may occur in applying FRIS within this context. Those forest stands identified by the Old Growth Definition Committee as potential old growth will require field verification.

The Old Growth Definition Committee identified issues connected with interpretation of the Forest Resource Inventory System data:

- **Stand Age** – The original Old Growth Habitat Index, developed by Dr. Tom Spies for western Oregon, used stand age as one of the stand components of the Index. The Old Growth Definition Committee chose not to use stand age for the Western Washington Index in part because FRIS estimates of stand age are not based on the actual age of the oldest trees. Given the nature of available data, the Weighted Old Growth Habitat Index provides a more reliable approach.
- **FRIS Mapping Unit Polygons** – In some cases, a FRIS mapping unit polygon (or forest stand) may include two or more stand age classes. When this occurs, the Weighted Old Growth Habitat Index component values from sample plots in the younger portion of the FRIS mapping unit may dilute the values contributed by plots in the older portion of the mapping unit. The resulting Index value may be lower than the threshold value of 60. To rectify this, a subset of stands with an Index lower than 60 has been identified for which secondary screening is necessary.

In some cases, the boundary of the FRIS mapping unit polygon may be placed along a stream, a road, or a ridge top and may divide an old growth stand into two separate polygons. In cases like these, the Index component values from sample plots in the old-growth portion of the FRIS mapping unit are diluted by the plots value in the younger portion of the mapping unit. The resulting mapping unit Weighted Old Growth Habitat Index value may be too low, giving no indication that there may be areas of old growth embedded within the two FRIS mapping unit polygons. Further analysis of the mapping unit using aerial photo review, site potential assessments or field verification will be necessary to identify these smaller areas of potential old growth.

- **Plant Association Groups** Most FRIS mapping unit polygons include information on plant association. This data has been grouped into Plant Association Groups (PAGs) to reflect ecological conditions, which define growing conditions. Some of these PAGs have abnormally wet, dry, or cold conditions that may result in old trees of smaller diameters. Because large diameter trees are a major component in the Index, the resulting score for these units may be below the threshold value, yet they might have the required structure to be considered old growth. Again, further analysis of the stand such as aerial photo review, site potential assessments, and field verification will be used to identify these units.

Potential errors using the Weighted Old Growth Habitat Index

The Weighted Old Growth Habitat Index evaluation is subject to at least two sources of error.

- First, there is variation in the characteristics sampled; therefore, the Index also is subject to variability. Sampling variation occurs in the characteristics comprising the Index; hence, the Index also is subject to these statistical variations.
- Second, FRIS was designed to sample site-specific data within designated mapping units. A mapping unit is described as a contiguous forest community that is sufficiently uniform in topography and vegetative characteristics to be distinguishable from adjacent communities. These mapping units are used to measure general site potential and vegetative characteristics. FRIS was not designed specifically to identify stands of old growth. Consequently, the stand population will have inclusions of tree groups not required in the committee's definitions of old growth condition. Conversely, there may be inclusions of old growth tree groups within a stand where the vast majority of the trees are of a younger age and a less diverse condition.

Summary of potential old growth acreage on DNR-managed lands

Using the Old Growth Definition Committee's Weighted Old Growth Habitat Index, DNR FRIS inventory analysis estimates as much as 88,435 acres of potential old growth on DNR-managed forestlands in Western Washington. As previously stated, it was recommended by the Old Growth Definition Committee that these areas receive additional screening and field verification. Included in this acreage is old growth within Natural Area Preserves and Natural Resource Conservation Areas, which contribute to the objectives of DNR's Habitat Conservation Plan for state trust lands.

The legislative mandate ESHB 2573, section 905 required DNR to create tables describing "the number of acres of stands in each county, the department's administrative unit, and forest type."

Potential old growth acres within each Westside county

As previously stated, the 2004 legislative direction ESHB 2573, section 905 directed DNR to conduct an inventory of old growth on state lands as defined by a panel of scientists. This directive also required the inventory to include maps illustrating the distribution of old growth forest stands on state lands, and tables describing the number of acres of stands in each county.

As seen in Table 2.1, the majority of potential old growth is located within the Olympic Peninsula in the Olympic Experimental State Forest (OESF). This majority of the OESF is located in Clallam and Jefferson counties with 16,548 acres and 39,546 acres of high likelihood potential old growth and lower likelihood potential old growth, respectively. The third county containing the majority of the potential old growth is Snohomish County with 16,210 acres.

**Table 2.1 Potential Old Growth (Acres)
by Western Washington County**
(All figures are estimates, subject to field verification)

County	High Likelihood Potential Old Growth (WOGHI = 60+) ¹	Lower Likelihood Potential Old Growth (WOGHI < 60) ²	Total ³
Clallam	1,414	15,134	16,548
Clark	26	0	26
Cowlitz	1,607	731	2,338
Grays Harbor	78	146	224
Jefferson	25,363	14,183	39,546
King	2,442	522	2,964
Lewis	53	546	599
Mason	0	12	12
Pacific	290	553	843
Pierce	0	38	38
San Juan	224	0	224
Skagit	3,358	510	3,868
Skamania	1,060	737	1,797
Snohomish	15,834	376	16,210
Thurston	265	33	298
Wahkiakum	0	263	263
Whatcom	653	1,984	2,637
Grand Total	52,666	35,769	88,435

1 Weighted Old Growth Habitat Index (WOGHI) score of 60 or more out of 100 has a high probability of being old growth. This includes stands aged 160 years or more, where the Index is not available.

2 Some stands with a WOGHI score less than 60 that may be old growth but need secondary screening.

3 Acres values are from Sustainable Harvest Implementation data set 2.

Potential old growth acres within each Westside forest type

The 2004 legislative direction ESHB 2573, section 905 also directed DNR to conduct an inventory of old growth on state lands and provide tables describing the number of acres of stands in each forest type. The Old Growth Definition Committee categorized these forest types into plant association groups (PAGs). However, the FRIS inventory does not include plant association data for all stands.

As seen in Table 2.2, the majority of potential old growth is located within the Western Hemlock/Douglas fir moist forest type that is predominantly located within the OESF. Total acreage of potential old growth in this forest type is 16,366 acres. The second largest forest type containing potential old growth is the Douglas fir/Western Hemlock drier Westside forest type located in the western Cascades and contains 13,112 acres. The third forest type containing the majority of the potential old growth is the Silver fir mesic forest, containing 9,836 acres.

Table 2.2 Old growth (acres) by Western Washington forest types
(All figures are estimates, subject to field verification)

Forest Type	High Likelihood Potential Old Growth (WOGHI = 60+) ¹	Lower likelihood Potential Old Growth (WOGHI < 60) ²	Total ³
Douglas-fir Western hemlock drier Westside forest	6,057	7,065	13,122
Grand fir moist east Cascades forest	0	21	21
Silver fir mesic forest	6,217	3,619	9,836
Sitka spruce Western hemlock coastal forest	748	7,642	8,390
Western hemlock/Douglas-fir moist forest	4,817	11,549	16,366
Western hemlock/Silver fir high elevation forest	536	613	1,149
Unknown – information not available ⁴	34,291	5,260	39,512
Total	52,666	35,769	88,435

1 Washington Old Growth Habitat Index (WOGHI) score of 60 or more out of 100 has a high probability of being old growth. This includes stands aged 160 years or more, where the Index is not available.

2 Some stands with a WOGHI score less than 60 that may be old growth but need secondary screening.

3 Acres values are from Sustainable Harvest Implementation data set 2.

4 Forest Type is unknown where earlier inventory did not observe Plant Associations.

Potential old growth acres within each Westside Administrative Unit

The 2004 legislative direction ESHB 2573, section 905 also directed DNR to conduct an inventory of old growth on state lands and provide tables describing the number of acres of stands in each administrative unit. DNR has specified an “administrative unit” as an HCP Planning Unit.

As seen in Table 2.3 the majority of potential old growth is located within the OESF HCP Planning Unit with 55,705 acres of potential old growth. The HCP Planning Unit containing the second largest acreage of potential old growth is the North Puget HCP Planning Unit, which contains 25,309 acres of potential old growth. The remaining Westside HCP Planning Units contain a much smaller portion of the total potential old growth as identified using the Weighted Old Growth Habitat Index.

Table 2.3 Old growth (acres) by Western Washington Habitat Conservation Plan (HCP) Planning Unit (Administrative Unit)
(All figures are estimates, subject to field verification)

HCP Planning Unit	High Likelihood Potential Old Growth (WOGHI = 60+) ¹	Lower Likelihood Potential Old Growth (WOGHI < 60) ²	Total ³
Columbia	2,871	1,845	4,717
North Puget	21,977	3,332	25,309
OESF	26,695	29,011	55,705
South Coast	221	650	871
South Puget	820	613	1,433
Straits	82	318	400
Total	52,666	35,769	88,435

1 Washington Old Growth Habitat Index (WOGHI) score of 60 or more out of 100 has a high probability of being an old growth stand. This includes stands aged 160 years or more, where the Index is not available.

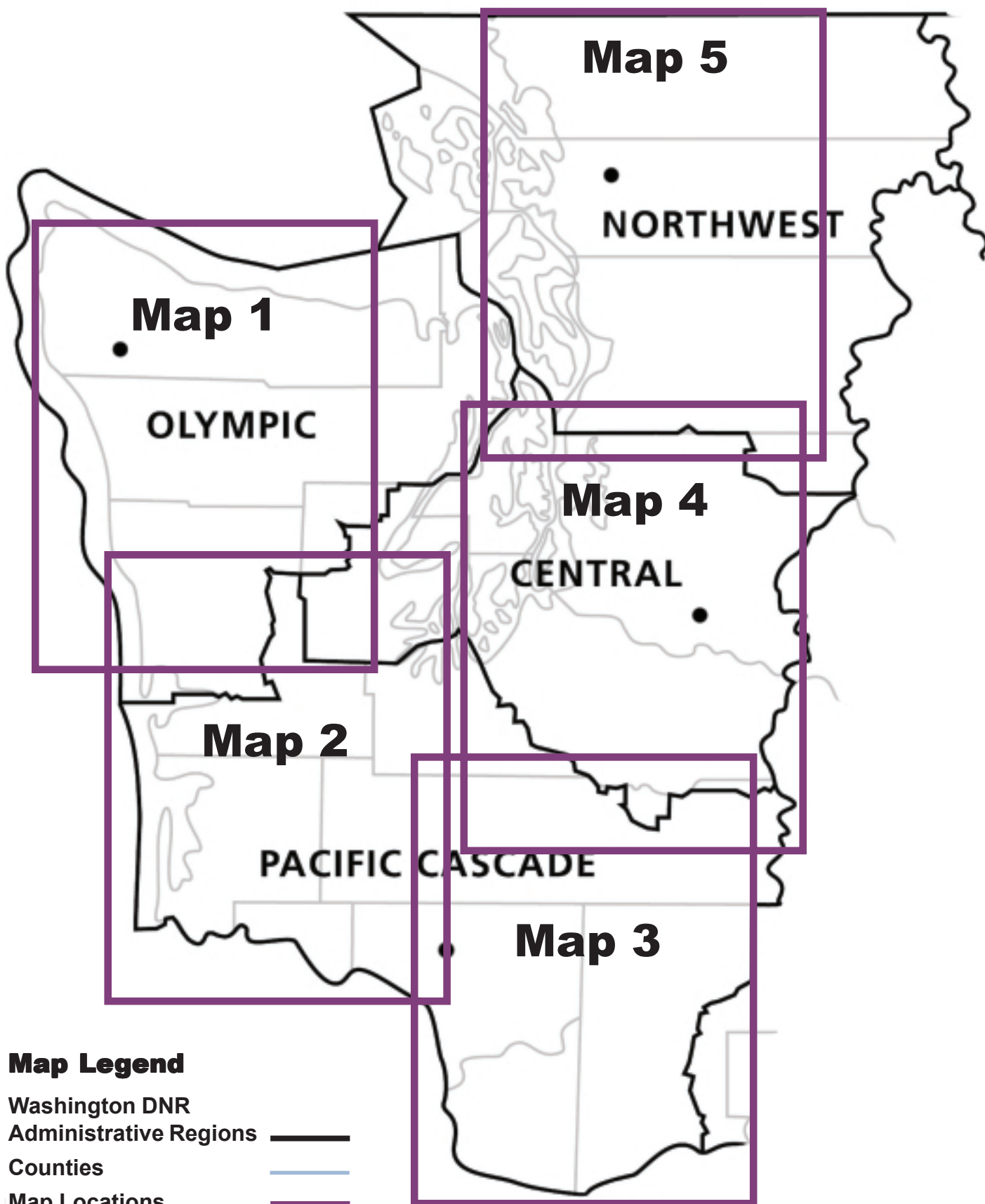
2 Some stands with a WOGHI score less than 60 that may be old growth but need secondary screening.

3 Acres values are from Sustainable Harvest Implementation data set 2.

Maps of old growth on Westside DNR-managed lands

The maps on the following pages show potential old growth, using the Index developed by the Old Growth Definition Committee.

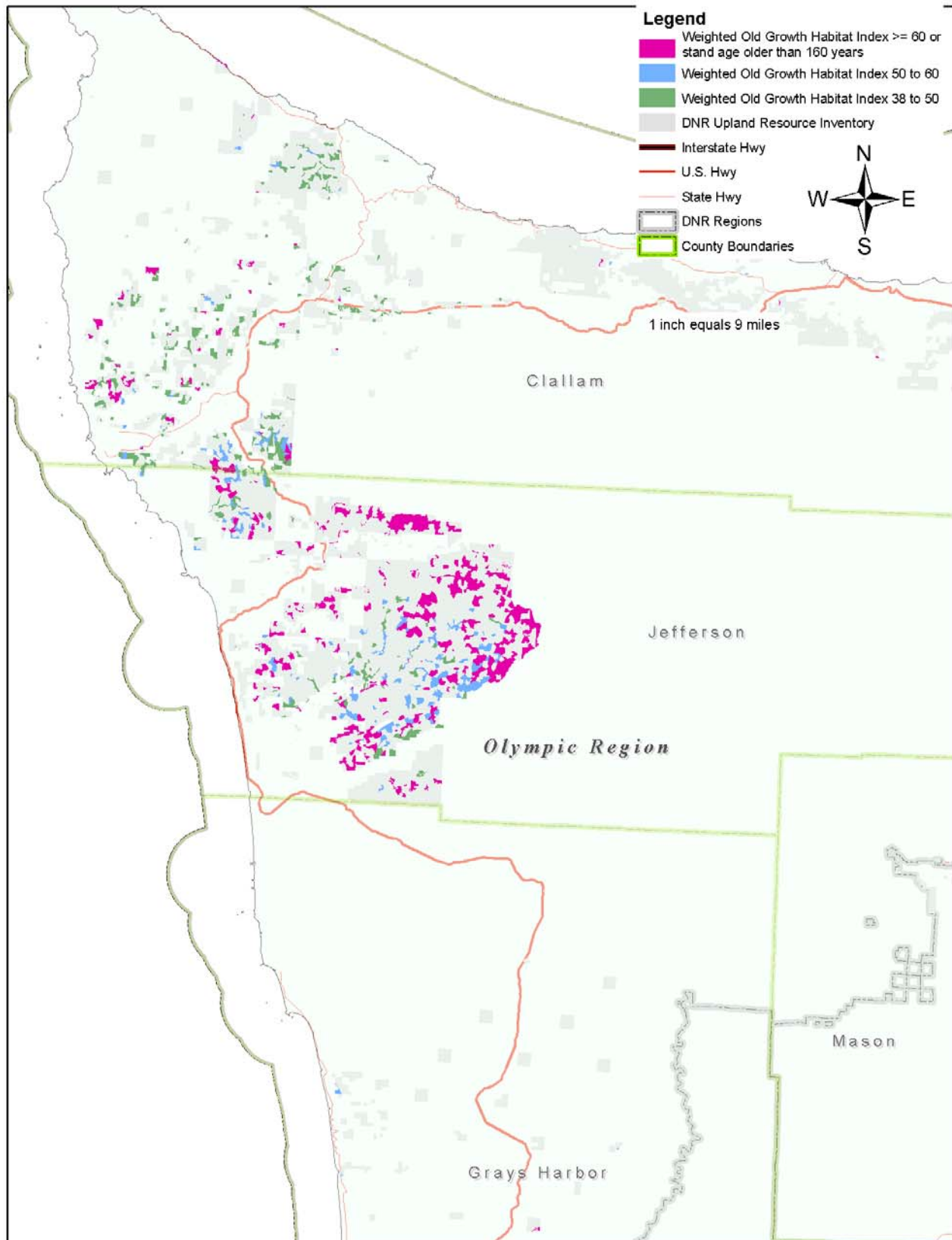
Old Growth Inventory on DNR-managed State Lands
Index Map for Maps Series



Old Growth Potential on DNR-managed Lands

Map 1

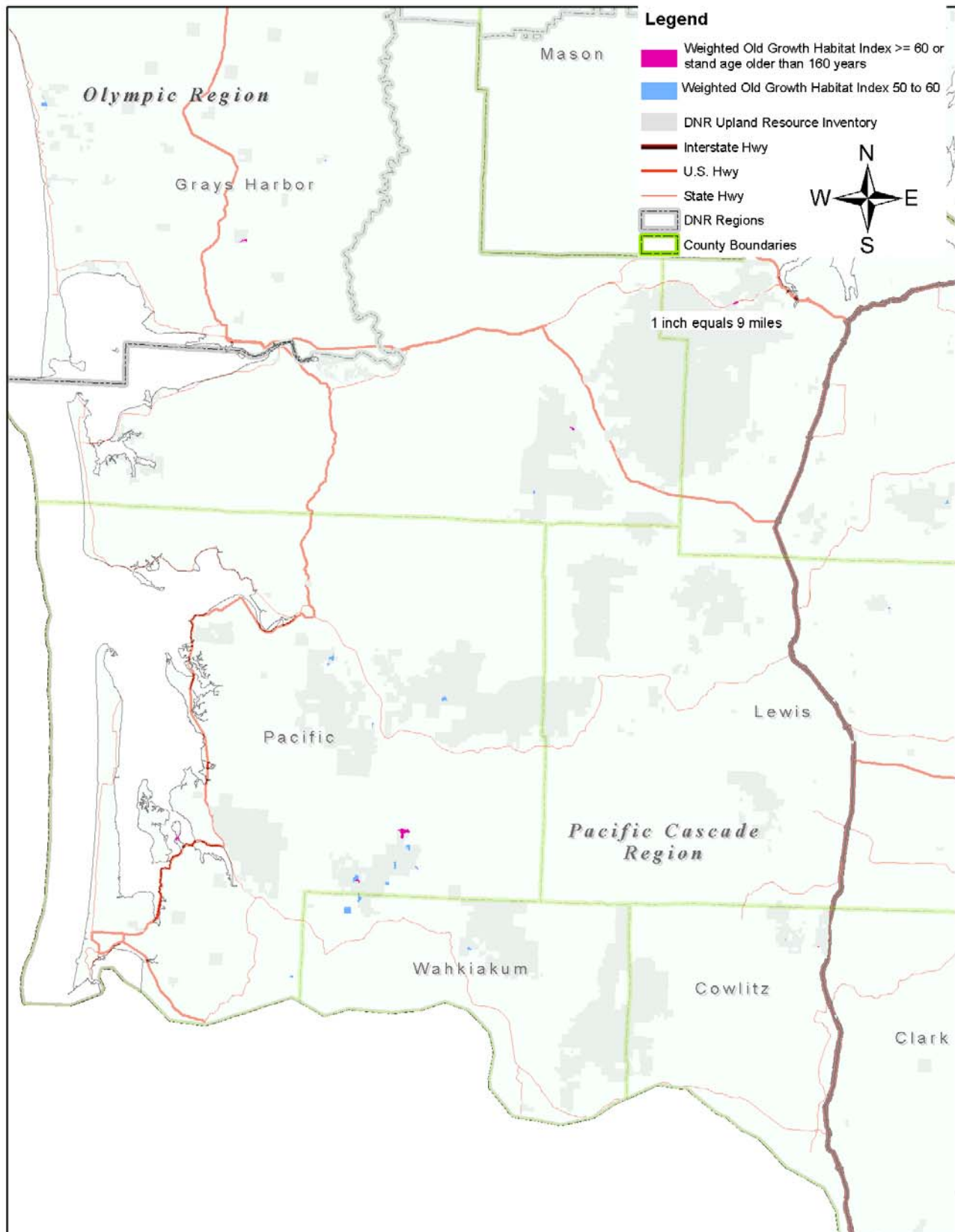
Using Weighted Old Growth Habitat Index, or stand age older than 160 years where the index value is not available



Old Growth Potential on DNR-managed Lands

Map 2

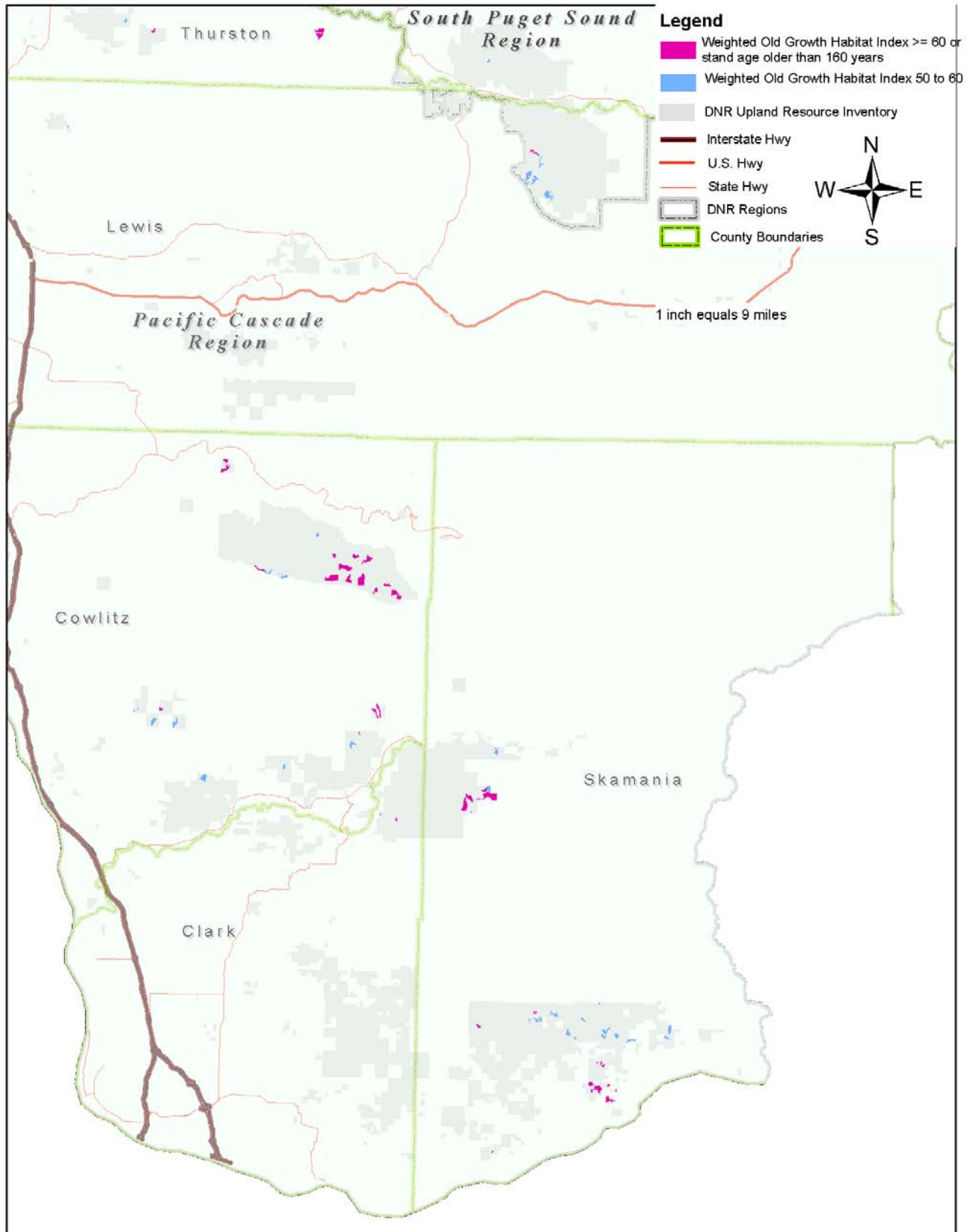
Using Weighted Old Growth Habitat Index, or stand age older than 160 years where the index value is not available



Old Growth Potential on DNR-managed Lands

Map 3

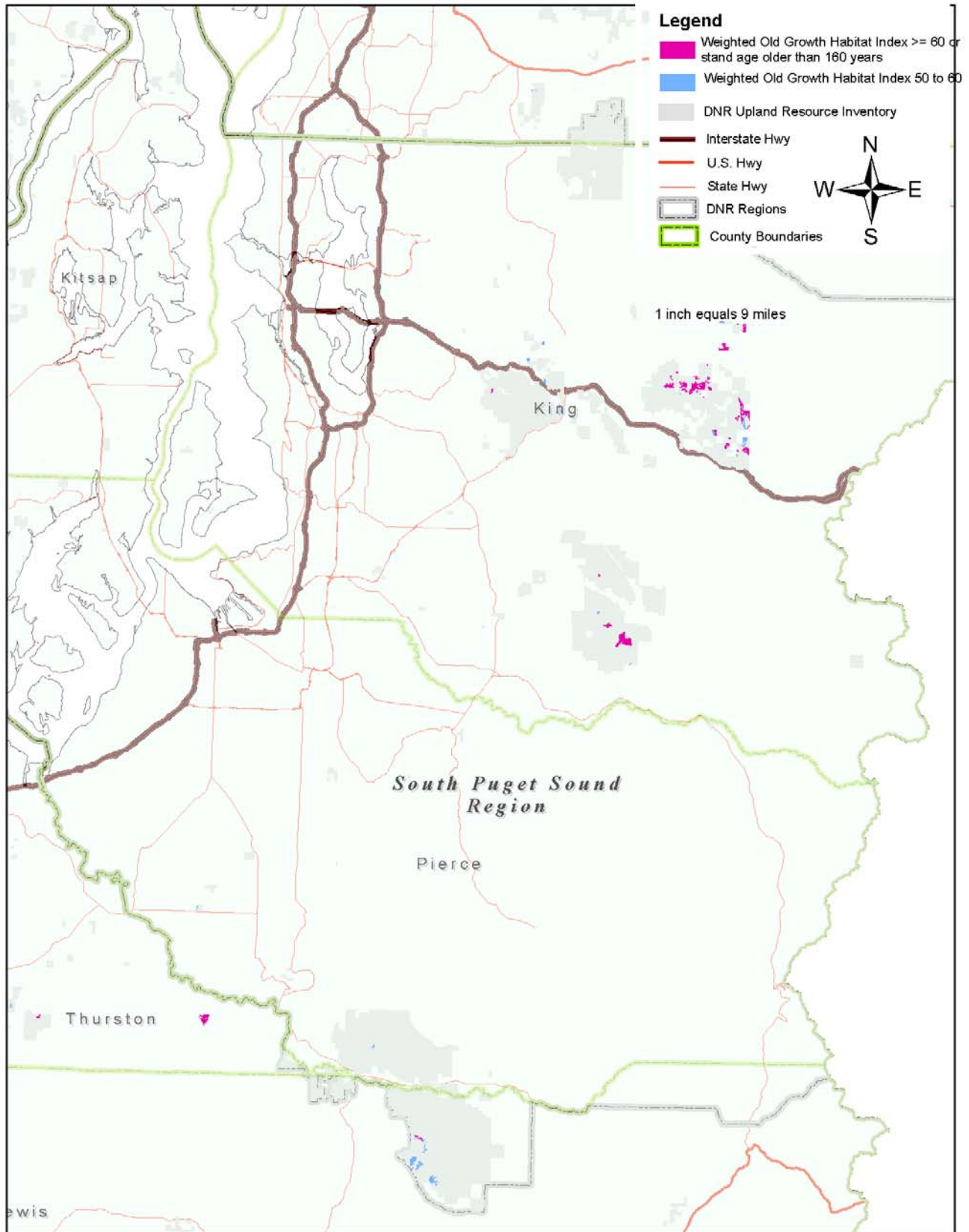
Using Weighted Old Growth Habitat Index, or stand age older than 160 years where the index value is not available



Old Growth Potential on DNR-managed Lands

Map 4

Using Weighted Old Growth Habitat Index, or stand age older than 160 years where the index value is not available



Old Growth Potential on DNR-managed Lands

Map 5

Using Weighted Old Growth Habitat Index, or stand age older than 160 years where the index value is not available

